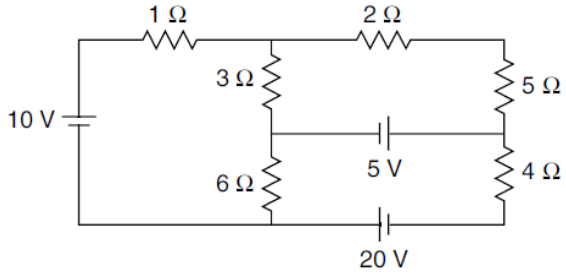
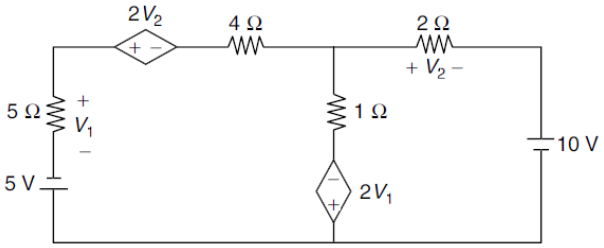
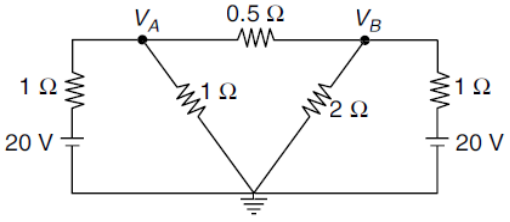
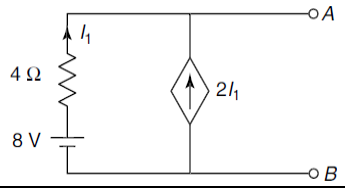
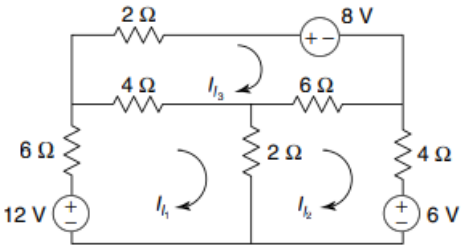
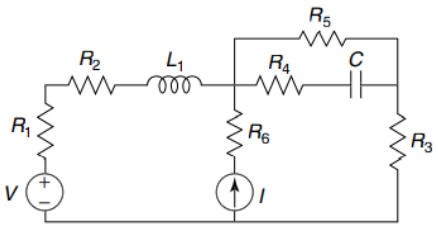
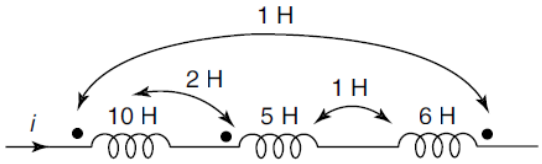
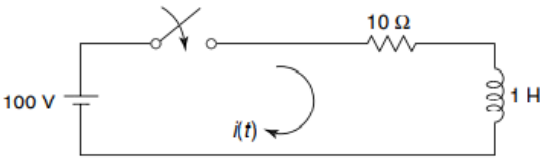
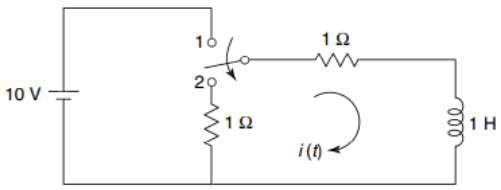
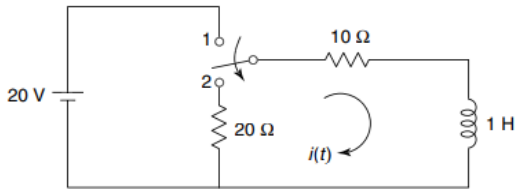
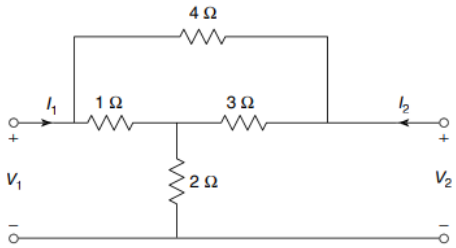
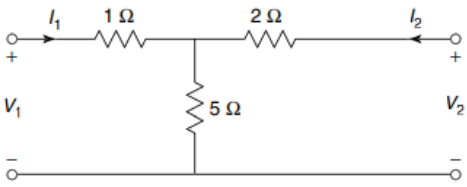
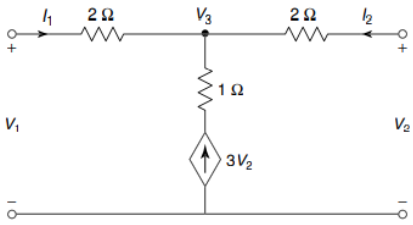
SVKM's
D. J. Sanghvi College of Engineering

Program: B.Tech in Electronics & Telecommunication Engineering **Academic Year: 2022** **Duration: 3 hours**
Date: 23.01.2023
Time: 09:00 am to 12:00 pm
Subject: Electrical Network Analysis and Synthesis (Semester III) **Marks: 75**

Instructions: Candidates should read carefully the instructions printed on the question paper and on the cover page of the Answer Book, which is provided for their use.
(1) This question paper contains three pages.
(2) Use of Non- Programmable Scientific Calculator.
(3) All Questions Are Compulsory.
(4) All questions carry equal marks.
(5) Answer to each new question is to be started on a fresh page.
(6) Figures in the brackets on the right indicate full marks.
(7) Assume suitable data wherever required, but justify it.
(8) Draw the neat labelled diagrams, wherever necessary.

Question No.		Max. Marks
Q1 (a)	Using Mesh Analysis, Find the current through 5 Ohm.  **OR** Find Mesh Currents in the network given-  	[05] [05]
Q1 (b)	i. Find the Node Voltages V_A & V_B  	[05]

	ii. Obtained Thevenin's Equivalent network from the given network at terminal A & B. 	[05]
Q2 (a)	i. Write down the Tieset matrix and obtain the network equilibrium equation in matrix form using KVL. Calculate loop currents.  **OR** i. Draw the Oriented graph and Find the Incidence matrix, Also Write down the Tieset matrix of given circuit. 	[10] [10]
Q2 (b)	Find the Equivalent Inductance of the network from given circuit. 	[05]
Q3 (a)	In the given network, the switch is closed at t = 0. With zero current in the inductor, find, $i, \frac{di}{dt}$ and $\frac{d^2i}{dt^2}$ at t=0⁺ 	[05]
Q3 (b)	i. In the network given the switch is moved from the position 1 to 2 at t = 0, steady-state condition having been established in the position 1. Determine i (t) 	[05]

	ii) In the network shown, the switch is changed from the position 1 to the position 2 at t = 0, steady condition having reached before switching. Find $i, \frac{di}{dt}$ and $\frac{d^2i}{dt^2}$ at t=0⁺ 	[05]
Q4 (a)	Realise following Impedance function in Foster-I and Foster-II form. $Z(S) = \frac{4(S^2+1)(S^2+9)}{S(S^2+4)}$	[10]
Q4 (b)	i. Test whether given function is Positive Real Function, $F(S) = \frac{(S^2+6S+5)}{(S^2+9S+14)}$ **OR** ii. Test whether the given polynomial is Hurwitz or Not? 1. $P(S) = S^3 + 4S^2 + 5S + 2$ 2. $P(S) = S^4 + 7S^3 + 6S^2 + 21S + 8$	[05] [05]
Q5 (a)	i. Find the open-circuit impedance parameters for the given network-  ii. Find the transmission parameters for the given network- 	[05] [05]
Q5 (b)	Find Y-parameters of the given network – 	[05]